

### Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms and definitions
4	MPEG-V system architecture
5	Use cases
5.1	General
5.2	System architecture for information adaptation from virtual world to real world
5.3	System architecture for information adaptation from real world to virtual world
5.4	System architecture for exchanges between virtual worlds
6	Instantiations
6.1	Instantiation A: representation of sensory effects (RoSE)
6.1.1	System architecture for representation of sensory effects
6.1.2	Instantiation A.1: multi-sensorial effects
6.1.3	Instantiation A.2: motion effects
6.1.4	Instantiation A.3: arrayed light effects
6.2	Instantiation B: natural user interaction with virtual world
6.2.1	System architecture for natural user interaction with virtual world
6.2.2	Examples of sensors
6.2.2.1	Gaze tracking sensors
6.2.2.2	Multi-pointing sensors
6.2.2.3	Smart camera
6.2.3	Instantiation B.1: Full motion control and navigation of avatar/object with multi-input sources
6.2.4	Instantiation B.2: serious gaming for ambient assisted living
6.2.5	Instantiation B.3: gesture recognition using multipoint interaction devices
6.2.6	Instantiation B.4: avatar facial expression retargeting using smart camera
6.2.7	Instantiation B.5: motion tracking and facial animation with multimodal interaction
6.2.7.1	Motion tracking
6.2.7.2	Facial animation
6.2.8	Instantiation B.6: serious gaming and training with multimodal interaction
6.2.9	Instantiation B.7: virtual museum guide with embodied conversational agents
6.3	Instantiation C: traveling and navigating real and virtual worlds
6.3.1	System architecture for traveling and navigating real and virtual worlds
6.3.2	Examples of sensors and path finding mechanisms
6.3.2.1	Attributed coordinate sensors
6.3.2.2	Path finding
6.3.2.3	General technical details
6.3.2.4	Automatically obtaining of the height map (extension)
6.3.3	Instantiation C.1: virtual travel
6.3.4	Instantiation C.2: virtual traces of real places
6.3.5	Instantiation C.3: virtual tour guides
6.3.6	Instantiation C.4: unmanned aerial vehicle scenario
6.4	Instantiation D: interoperable virtual worlds
6.4.1	System architecture for interoperable virtual worlds
6.4.2	Instantiation D.1: avatar appearance
6.4.3	Instantiation D.2: virtual objects

- 6.5 Instantiation E: social presence, group decision making and collaboration within virtual worlds
- 6.5.1 System architecture
- 6.5.2 Instantiation E.1: social presence
- 6.5.3 Instantiation E.2: group decision making in the context of spatial planning
- 6.5.4 Instantiation E.3: consumer collaboration in product design processes along the supply chain
- 6.6 Instantiation F: interactive haptic sensible media
- 6.6.1 System architecture for interactive haptic sensible media
- 6.6.2 Instantiation F.1: Internet haptic service — YouTube, online chatting
- 6.6.3 Instantiation F.2: next-generation classroom — sensation book
- 6.6.4 Instantiation F.3: immersive broadcasting — home shopping, fishing channels
- 6.6.5 Instantiation F.4: entertainment — game (Second Life®, StarCraft®2 StarCraft® is a trademark of Blizzard Entertainment, Inc. It is given as an example for the users of this document and does not constitute an endorsement by ISO or IEC.), movie theatre
- 6.6.6 Instantiation F.5: virtual simulation for training — military task, medical simulations
- 6.6.6.1 Military training task
- 6.6.6.2 Medical simulations
- 6.7 Instantiation G: bio-sensed information in the virtual world
- 6.7.1 System architecture for bio-sensed information in the virtual world
- 6.7.2 Instantiation G.1: interactive games sensitive to user's conditions
- 6.7.3 Instantiation G.2: virtual hospital and health monitoring
- 6.7.4 Instantiation G.3: mental health for lifestyle management
- 6.7.5 Instantiation G.4: food intake for lifestyle management
- 6.7.6 Instantiation G.5: cardiovascular rehabilitation for health management
- 6.7.7 Instantiation G.6: glucose level/diabetes management for health management
- 6.8 Instantiation H: environmental monitoring with sensors
- 6.8.1 General
- 6.8.2 System architecture for environmental monitoring
- 6.8.3 Instantiation H.1: environmental monitoring system
- 6.9 Instantiation I: virtual world interfacing with TV platforms
- 6.10 Instantiation J: seamless integration between real and virtual worlds
- 6.10.1 System architecture for seamless integration between real and virtual worlds
- 6.10.2 Instantiation J.1: seamless interaction between real and virtual worlds with integrating virtual and real sensors and actuators
- 6.11 Instantiation K: hybrid communication
- 6.12 Instantiation L: makeup avatar
- 6.12.1 Spectrum data acquisition
- 6.12.1.1 From a multispectral camera
- 6.12.1.2 From an ordinary camera based on camera characterization
- 6.12.1.3 Spectrum data combination in a virtual world
- 6.12.1.4 Cosmetic colour spectrum metamerism
- 6.12.1.5 Colour reproduction process for a virtual makeup avatar
- 6.12.2 Transformation model generation
- 6.13 Instantiation M: usage scenario for automobile sensors
- 6.13.1 Helping auto maintenance/regular inspection
- 6.13.2 Monitoring for eco-friendly driving
- 6.14 Instantiation N: usage scenario for 3D printing
- 6.15 Instantiation O: olfactory information in virtual world
- 6.15.1 System architecture for olfactory information in virtual world
- 6.15.2 Instantiation O.1: olfactory signature(fingerprint) with e-nose
- 6.15.3 Instantiation O.2: 4D film with scent effect
- 6.15.4 Instantiation O.3: healing minds of combat veterans
- 6.15.5 Instantiation O.4: advertisement with olfactory information
- 6.15.6 Instantiation O.5: harmful odour monitoring
- 6.16 Instantiation P: virtual panoramic vision in car
- 6.16.1 General
- 6.16.2 Instantiation O.6.1: virtual panoramic IVI (in-vehicle information system)
- 6.16.3 Instantiation O.6.2: virtual panoramic black box
- 6.17 Instantiation Q: adaptive sound handling